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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •

MARCH 21, 1936

Once Around the Pole

See Page 186

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Edited by WATSON DAVIS

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DO YOU KNOW?

Greenland's big glaciers sometimes move 100 feet a day.

Butchers in Vienna are planning a soap works, to use up waste fat products.

Wattled ibises from Ethiopia are among the rare birds in the New York Zoo.

There are 35 species of hawks known to live or visit in America north of Mexico.

There are almost 200 varieties of quartz, amethyst being one of the most beautiful.

Green apples are more than twice as rich in pectin, the basis of fruit jellies, as ripe apples.

Near-sightedness is found to be rapidly increasing in Japan among school children and students.

A large cave under the Acropolis at Athens is being excavated by Lincoln MacVeagh, American Minister to Greece.

The best maple syrup is obtained from sap that flows early in the season.

Tobacco pipes up to six feet long are smoked at ceremonies by African chiefs in the Cameroons.

India's four-horned antelope is unique, other hollow-horned animals having only two horns.

Raisinseed oil is a new oil for salads and cooking, and is also found useful to painters, as it spreads quickly on canvas and dries slowly.

To encourage Germans to grow more fruit, the German government is paying a subsidy allotted to growers who plant at least ten fruit trees.

Lima beans are named after Lima, Peru, where a United States Navy captain obtained seed in 1824 and brought them to his farm in New York.

The task of naming the world's creatures is still going on—over 700,000 kinds of insects have been named and described, and new ones are still being found.

WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

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MEDICINE

Diet, Rest Important For High Blood Pressure Patients

Such Individuals Should Avoid Overeating, to Prevent Stoppage in Hardened Arteries; Surgery for Some Cases

WHEELED in on a stretcher, a coal-grimed janitor suffering from apoplexy appeared before a clinic of the American College of Physicians meeting and helped his physician emphasize facts about high blood pressure.

The moral of the janitor, said Dr. O. H. Perry Pepper of Philadelphia, is that certain people are better off with high blood pressure than when it drops to a lower and more normal level.

You could see the coal-grime stains on the janitor's hands as Dr. Pepper held up his arms to show the arteries. A week before, the physician explained, the janitor had dropped to the floor while shoveling coal, stricken with apoplexy. For ten years insurance medical examiners had noted a high blood pressure in the janitor. Yet when he was brought to the hospital his blood pressure was down to a low level. Nevertheless he was suffering.

Persons of the janitor's type, as far as their blood pressure is concerned, may actually be safer if the blood pressure is kept from dropping to lower levels.

"Be brave," said Dr. Pepper to his colleagues, when patients of this type are encountered, and try to raise the blood pressure when it is low, providing it is known or suspected that such patients normally are among the high blood pressure group.

Care Advised

The lesson Dr. Pepper gave was that the person with high blood pressure should be kept from getting tired out physically, should be protected from nervous or emotional shock, from worry, should go to bed and take care of himself for every illness, even a cold. Any of these conditions, worry, shock, infection, prolonged physical exertion, lower the blood pressure in normal persons, and in those with habitual high blood pressure, the drop may be dangerous.

Another thing for the person with habitual high blood pressure to guard against is overeating. Dr. Pepper said the older doctors who diagnosed as acute indigestion the condition now diagnosed as a certain form of heart attack—coronary thrombosis is the technical term—were probably right. The person with habitual high blood pressure generally has hardened arteries; "rusty pipes," Dr. Pepper called them. If he "makes a pig of himself" by overeating, he gets a drop in blood pressure, meaning that the blood isn't pumped at a high enough pressure to circulate through the arteries. Then a stoppage or thrombosis occurs in "that artery best prepared by the rust for the plumbing to stop."

Another new technique which doctors now use to combat high blood pressure that cannot be reduced by medical means is to operate on certain nerve paths to the brain. Dr. Max Peet of the University of Michigan described the operation. He was talking about patients differing from the janitor example of Dr. Pepper.

Improvement in such patients, following the operation, is most striking, said Dr. Peet, although with scientific caution he pointed out that it had only been used for the last two years.

Over a third of the 130 patients operated on by his method so far are now back home living normal lives, going about their business, untroubled by the high blood pressure, kidney disorder or eye disturbances which had been among the features of their gravely sick state before the operation. Only 7 per cent. of the cases showed no improvement after the operation and 4 per cent. failed to survive it.

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BIOLOGY

Over 10,000 Sterilization Operations in California

OVER 10,000 human sterilization operations—10,801, to be exact—have been performed in accordance with the California state sterilization law, E. S. Gosney, president of the Human Betterment Foundation, announced after compiling the 1935 figures.

These operations, Mr. Gosney pointed out, were performed on inmates of state institutions since 1909.

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THE LIVING AND THE DEAD

Above: cells of living onion epidermis under ultraviolet radiation absorb all of it and show up black in the photograph; the few white cells are dead ones. Below: after being killed with heat, all cells show up white.

BIOLOGY

Dead Plant Cells Show up White Under Ultraviolet

"WHITE as death" takes on new meaning, in experiments with plant cells and ultraviolet rays performed by Dr. B. Luyet of St. Louis University and his collaborator P. M. Gehenio of the Biodynamica Laboratory, St. Louis, Mo. They found that when the outer skin cells of an onion pass from life to death their absorption for the ultraviolet rays is lost. Living cells are black in an ultraviolet photograph; dead cells come out white.

Transparency to utraviolet rays is now used by the St. Louis investigators as a method of diagnosis of death in their further study of the physico-chemical structure of living and dead matter.

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PUBLIC HEALTH

Eradication of Syphilis Possible if Openness is Used

Battle Cry Against One of Three Major Causes of Death Sounded by a Leader of Public Health Officers

A BATTLE cry against one of the great killers of man, one of his most dangerous disease enemies, was sounded by Dr. Thomas Parran, Jr., New York State Health Commissioner, at the meeting of the American College of Physicians. It was a stirring "fight talk" from a leader to his captains in the war on disease.

This disease ranks with tuberculosis and cancer as a major cause of death. It causes untold misery; denies many married couples the privilege of parenthood; causes helpless, innocent children to be born blind or deaf; cripples and finally drives insane many of its luckless victims.

The name of this dastardly disease is syphilis, a word that many persons do not like to speak or print or read. Not so long ago there was the same feeling about cancer, tuberculosis, even appendixes and gall bladders. Yet these have become part of everyday speech. Syphilis must also be read about and heard about so that this deadly foe can be vanquished. Refusing to name the enemy ends in defeat, not conquest.

This disease enemy of the unmentionable name, syphilis, can be conquered, Dr. Parran told the physicians. The outlook for the control of syphilis is far more hopeful than for the control of cancer. It is far more hopeful than was the outlook for the control of tuberculosis thirty years ago.

"The practical control and even eradication of tuberculosis in this country is a goal clearly in sight," said Dr. Parran.

"Germ" is Known

By comparison, the job of controlling syphilis should be far quicker, it seems from what he told the doctors. For medical scientists know the "germ" that causes the disease. They can diagnose it as soon as the patient becomes infectious and dangerous to others. They have remedies which will quickly make the infectious patient non-infectious and prevent his giving the malady to others.

The big thing is to think of syphilis as a disease, to think of the person who has it as a sick person whose ailment is catching, but who can be treated so that in a short time he will not be in danger of giving the disease to anyone else. Another hopeful thing about this disease is that if discovered and treated thoroughly at the start, the damage it may do to body and brain and to future generations can be prevented.

Talking to the doctors, Dr. Parran described the splendid record of the Scandinavian countries where syphilis is now rare, and told how the United States could equal this record.

The first step is to have health departments with the cooperation of practicing physicians go after syphilis as they would an epidemic of measles or smallpox. Report every case, although not necessarily by name. Investigate the source, that is, find out where the patient caught the disease, and what persons he has been in contact with since getting it. The contacts and the original source as well as the patient should be examined and treated, just as the cases of smallpox would be treated and the persons who had come in contact with the disease would be vaccinated, to protect themselves and the rest of the community.

To make this possible, there should be syphilis clinics in all centers of populations. At these clinics, with every provision for privacy, tests can be made to determine whether the patient has syphilis and treatment can be given if he cannot afford a private doctor.

Where these measures have been tried, as in the Scandinavian countries and more recently in Massachusetts and New York State, the syphilis situation has improved. The same can now be done in every state of the country.

"Available federal funds for social security make it possible," Dr. Parran said.

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PHYSICS

Einstein Refutes Attack On General Theory of Relativity

By MORRIS OSTROFSKY, Institute for Advanced Study, Princeton, N. J.

PROBABLY no field in modern science is attacked more often than the General Theory of Relativity.

In a recent paper to the *Physical Review* (Feb. 1) Dr. Ludwik Silberstein of Toronto, Canada, using a method developed by the Italian mathematician Tullio Levi-Civita, solved the so-called gravitational equation of the General Theory of Relativity for empty space for the special case of symmetry. Dr. Silberstein claimed that the solution which he obtained is "regular," that is, all right, throughout all space except for two special fixed points called singular points. An idea of a singular point may be obtained by analogy with a line. In this case a singular point will be a break or a sharp corner in the line.

In the interpretation of his solution Dr. Silberstein took the two singular points to represent material particles and reached the conclusion that the General Theory of Relativity predicts no mutual acceleration of the two particles. This, of course, is known to be wrong, as two material particles in free space will attract one another and move accordingly. It seemed therefore that the Theory of Relativity is incorrect.

In publishing their answer to this charge, Prof. Einstein and his young assistant, Dr. Nathan Rosen, say that, in the first place, it is not correct to represent a material particle by a singular point in the Field Theory of General Relativity as did Dr. Silberstein. This makes the latter's premise wrong. In the second place, even granting this premise, Prof. Einstein and Dr. Rosen show that in the solution of the gravitation equation there appear, in addition to the two singular points, other singularities. Therefore, the conclusions drawn by Dr. Silberstein can not, in any case, be made. These facts were pointed out by Prof. Einstein to Dr. Silberstein even

before the latter published his results.

So to date there has not been brought any valid argument, either theoretical or experimental, against the General Theory of Relativity.

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GEOLOGY

Great Lakes Harbors Growing Deeper Due to Tilt

American Side Gaining at Expense of Canada Through Natural Laws Beyond Control of Either People

CANADA and the United States may have reciprocal trade agreements but the United States is benefiting at the expense of Canada in another matter over which man-made laws have no control. Harbors on the American side of the Great Lakes are getting deeper and those in Canada are becoming shallower.

The reason, as revealed by Capt. H. V. Canan, U. S. Corps of Engineers, is that the region about the Great Lakes is tilting about a "hinge line" which roughly is in the direction of 20 degrees west of north.

This tilt, says Capt. Canan (*The Military Engineer,* March-April), is generally improving conditions in harbors on the American side of the Great Lakes. He said:

"This action is material rather than merely of scientific interest and amounts to as much as 0.3 feet in some harbors. Considering vast harbor areas which are maintained to prescribed depths, a large saving in maintenance dredging costs will result when the effect of tilt on American harbors is given proper consideration.

"This uplift also affects the flow and the flow equations in the connecting rivers of the Great Lakes, and in computing flows for these rivers over extended periods its effects are clearly recognizable. Tilt has also been a factor in decreasing the available depths over the sills of the locks at Sault Ste. Marie, Michigan.

"Much of the evidence presented of decreasing lake levels is in reality the effect of tilt. Reports indicate that in about 1860, North Bay, Wisconsin, was an important harbor for schooner navigation, as many as 35 boats tying up there at one time. Adjoining a rock ledge, old ring bolts used for mooring these boats can still be found. Correcting the present charts for the stage of 1860, only about 3 feet of water would have been available. This loss of depth can only be attributed to earth tilt."

Describing what effect the observed land tilting will have on the future of the Great Lakes, Capt. Canan says:

"There has been much sensational speculation as to the geological future of the Great Lakes. Rather than the danger of the lakes draining down the St. Lawrence through failure of the outlet plugs, the more apparent danger, if tilt persists, is the draining of the Great Lakes above Niagara down the Mississippi system. While speculation of this sort may be mentally stimulating, any danger is so remote, and the engineering steps necessary for prevention are so relatively simple, that there is little danger of losing the vast investment made by the United States and Canada on the Great Lakes."

Generally accepted explanation for the land tilt on a line passing through the Great Lakes is that the land to the north, in Canada, is still rising from the enormous squeezing which it received during the last Ice Age.

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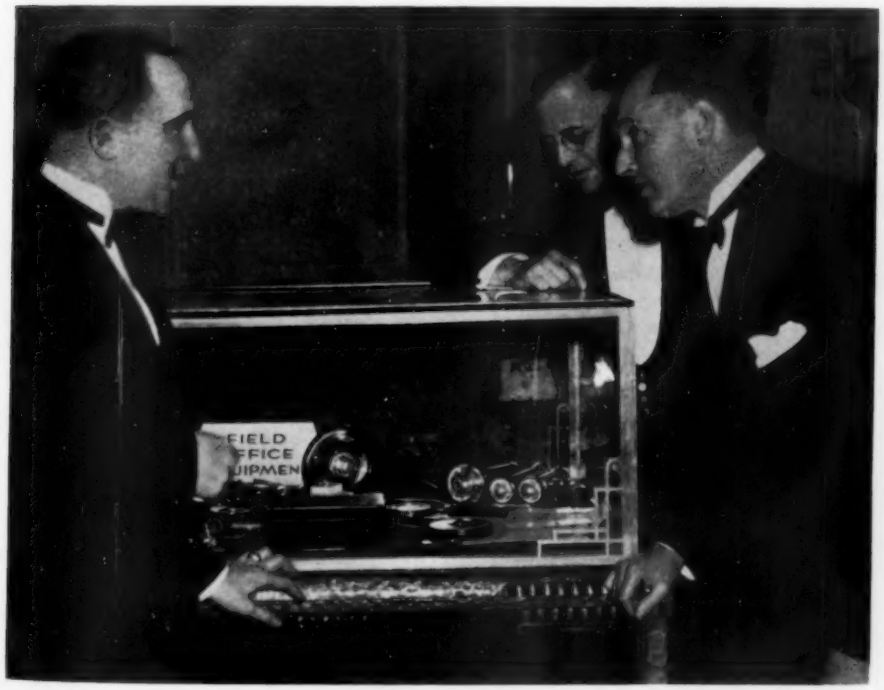

KIT OF MODERN "SHERLOCK"

L. C. Schilder (left), chief of the Identification Division, Federal Bureau of investigation, shows W. Chattin Wetherill, Vice-President, and Henry Butler Allen (right), secretary and director of the Franklin Institute, the field office equipment used by Department of Justice crime fighters. Mr. Schilder, as personal representative of J. Edgar Hoover, director of the Bureau of Investigation, took part in the ceremonies opening a new series of demonstrations on "Science in Crime Detection" at Franklin Institute.

CRIME DETECTION

Demonstration Shows How Science Aids Against Crime

A GRIM exhibit awaits visitors to the scientific exhibit halls of historic Franklin Institute in Philadelphia this spring.

There, beside the Planetarium that can transport you thousands of years in time or millions of miles in space, will be a new series of demonstrations emphasizing the hard realities of the present-day social problem of crime.

The dull footfalls of half a million armed men may be heard walking abroad in this land today, Director Henry Butler Allen of the Franklin Institute said at the ceremony opening the new exhibits. No neutrality law can be invoked to protect America against becoming involved in the depredations of

this army. Its members are public enemies, but not those of any foreign power. It is the army of crime.

But the laws of science do provide weapons for the hands of the officers of justice. The place of science in crime suppression was told at the opening ceremony by L. C. Schilder, personal representative of J. Edgar Hoover, Director of the Federal Bureau of Investigation, U. S. Department of Justice.

The science of dactylography—known to everyone as fingerprinting — affords a possibility of establishing identity for the protection of the innocent and conviction of the guilty. But more than that, it enables justice officials to follow the career of the criminal from place to place and crime to crime. Each day some 4,000 fingerprints come pouring in to the Department of Justice in Washington from 9,000 agencies in all parts of the world. These do not age; they remain always perfect identification of the individual. For fingerprints are changeless from about two months before the individual comes into the world until after he has left it.

The microscope in the crime detection laboratory, through the study of hair, bits of clothing, even dust, makes possible feats of detection that would have been considered miraculous a generation ago.

The science of chemistry lends aid in the analysis of blood, in cases of poisoning and in many other ways.

Photography, especially photomicrography, X-ray photography, and photography by ultraviolet light, provides society with another weapon.

Psychology and education of the public to a greater appreciation of the use of science and the problems of the police have yet to play their part, and the most important part in crime prevention, Mr. Schilder indicated. It is in this connection that the new exhibit was arranged by the Institute with the cooperation of law-enforcing agencies.

"Before the growing menace of murder, kidnaping, fraud, and violence can be stamped out in America, the minds of young boys and girls must be brought to an appreciation of the values of peace and security and honest dealing," he said. "Somehow the ideals of men and women must be raised to higher standards."

So now at the Franklin Institute, exhibit cases of guns, bullet-proof vests and shields, and the death mask of an arch-criminal who died of violence, offer for the first time publicly their mute but dramatic testimony of the need for a new psychological influence in the nation.

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RADIO

Radio Tube Without Filament Aid to Radio and Television

A NEW type radio tube without a filament and having potentialities in the development of television and the design of light-weight radio transmitters for aircraft was shown for the first time publicly before the meeting of the Institute of Radio Engineers by Philo T. Farnsworth, Philadelphia radio and television engineer.

The new radio tube is of the cold-cathode type and is known as the Multipactor. The operation of the tube, said Mr. Farnsworth, is based upon the harnessing of so-called secondary electrons which are emitted by certain metals when bombarded by other electrons inside the tube.

High amplification is achieved because a single free electron inside the tube liberates a million electrons from the cold cathode surfaces when it strikes. And it does this in a millionth of a second. Inside the tube the million freed electrons in turn strike the metal surfaces and liberate a million times a million other electrons from the cathode.

Enormous currents are thus quickly built up inside the tube which, if left uncontrolled, would release enough electrons to be equivalent to all the electric current consumed by all the electrical apparatus in the world.

While this great current gain is theoretically possible it is, of course, never achieved in practice, for the tube would naturally quickly have its parts fused together.

The free electrons of the tube which start the bombardment and the subsequent amplification gains in current, said Mr. Farnsworth, are normally present in the tube because of the action of natural radioactivity or cosmic rays, or because the electrons are released from metals by the action of light (photo-electric effect).

Quicker Response

The new tube, Mr. Farnsworth indicated, should be of great advantage in television transmission because of its quicker response and amplification. He also predicted that it would have considerable influence in the design of future radio transmitters, mentioning, especially, transmitting sets for aircraft where the question of weight and simplicity is of the highest importance.

The revolutionary part of this tube is that it operates without a hot filament, whereas in the standard type of present day radio tubes amplification is secured by the boiling off of electrons from the hot cathodes. This new tube operates by recruiting electrons from a cold surface. Because there is no heating of elements required, there is little loss of efficiency. Radio transmitters thus may be built with fewer tubes, operating at a much higher efficiency.

Quart-Size

In the I. R. E. demonstration one thousand watts of power were drawn from a tube about the size of a quart container. Because of its very high efficiency in the ultra-high frequency, the tube will materially decrease the cost of equipment for broadcasting stations using the ultra-high frequencies. This is particularly true of television.

Mr. Farnsworth pointed out that this decrease in the cost of transmitters for television would undoubtedly have some effect in overcoming the reluctance of broadcast station owners in the launching of television stations.

Probably the most interesting feature to the radio engineer is that in some of the designs of Farnsworth tubes, no filament, or heated cathode, of any type is used or needed. The great advantage of this can be seen when it is remembered that the life of ordinary tubes now in use ends when the filament burns out. Therefore, if these filamentless Farnsworth Multipactor tubes are operated within their ratings, there appears to be no good reason why they should not last indefinitely.

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There are more acres of tree land on American farms than acres of any other crop.

Removing very small impurities in common metals may so alter their properties that the pure metal is like a new product, not merely an improved one.

AERONAUTICS

Space Rocket Aircraft With "Dual Personality" Invented

Newly Patented Craft Is Conventional Airplane at Low Altitudes, Changing to Rocket in the Stratosphere

A VISTA of what air travel by rockets may be like 50 years hence has been opened by the patent of Prof. Robert H. Goddard, No. 1 rocket expert of the United States, just issued.

Dr. Goddard, Clark University scientist, has been experimenting for years at Roswell, N. M., with funds supplied jointly by the Carnegie Institution of Washington and the Daniel and Florence Guggenheim Foundation.

The Jekyll-Hyde aircraft, as described in the new Goddard patent, would change its shape from a conventional airplane at lower altitudes to a streamlined roaring rocket ship when the rarefied stratosphere is reached.

In the troposphere—the layer of air immediately surrounding the earth—the rocket airplane has wings, propellers, a tail skid, landing wheels, rudder and other conventional parts.

In the stratosphere and above, say over 100,000 feet, all projecting parts disappear into the body of the rocket ship and only stubby wings are left.

Instead of being driven by propellers at these high altitudes the rocket ship is hurled along with enormous velocities by jets of gases streaming at high speeds from nozzles in the tail of the rocket-plane.

Comfortably seated in the aircraft, passengers are protected from changes in temperature and pressure by the peculiar air-tight and insulated construction of the craft's body. Aboard, of course, is carried a supply of oxygen for the passengers.

When flying as an airplane, the propellers of this rocket-plane are not driven by supercharged gasoline motors, but by hot gases resulting from the combustion of hydrogen and oxygen. Shot against the blades of turbines to which the propellers are connected, these gases whirl them at tremendous speeds, much as steam is shot against the myriads of blades on turbo-electric generators.

From Dr. Goddard's Jekyll-Hyde aircraft may spring the rocket-propelled airliner which will solve tomorrow's transportation problems. There are those who hold that the rocket principle of flight must be developed before man will be able to soar at high altitudes in the neighborhood of 100,000 feet and at speeds of 1,000 miles or more per hour.

The versatility of Dr. Goddard's craft seems to take care of several difficulties now surrounding rocket flight. At low speeds a rocket is inefficient. While flying several thousands of miles per hour, it does not require any wings, yet in taking off and landing the opposite is true. Dr. Goddard's rocket-plane takes both these factors into consideration.

In take-off and landing, as well as flying at lower heights where ordinary propeller-driven planes are most efficient, it is easily converted by the pilot into such a plane. On entering the upper heights where the propeller fails to "bite" efficiently into the rare atmosphere, but where rocket flight increases in efficiency, the pilot operates various levers which retract and fold up the propellers, telescope the wing tips, pull in the landing gear, thus converting the plane into a rocket.

Simultaneously the "rocket motor" goes into action, shooting from nozzles the gases which hurl the rocket through space. When the rocket plane has reached its destination, and re-enters the lower air levels, rocket motors are shut off, propellers, wing tips, rudders, landing gear all unfold like the wings of a bird, and the pilot lands the craft safely as he would any airplane.

Among the immediate difficulties of constructing such a rocket-plane is the need for a suitable metal to withstand the enormous forces of erosion where the jets of gases strike the turbines whose job it is to turn the propellers at low altitudes.

In present-day rocket tests, much less pretentious than the patented rocket-plane, difficulty is already found because it seems impossible to make an orifice which will withstand the escaping gas jets. The openings will work for a short while but the high temperatures plus the velocity of impact of the gas against the metal soon wears them out.

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TALL GRASS

Tall corn is not the only thing that ever grew that way, "out in Ioway." Before its age-old sod was broken by the plow, Iowa was the heart of the tall-grass prairie region. Stalks of the Big Bluestem often reached a height of over six feet. A few survivors, found in the corner of a cemetery in the southern part of the state, are here shown in the hands of Marion Morrison, Des Moines citizen.

MEDICINE

Pneumonia is Not Single Disease, But a Group

PNEUMONIA is not one disease but a group of diseases, Dr. Rufus Cole of New York City stated at the meeting of the American College of Physicians. He made it clear that physicians must understand this fact in order to give successful treatment.

Serums for treatment of different kinds of pneumonia are available, but the serum for one type is not effective in treating pneumonia of another type. Consequently physicians must make a laboratory test to determine which type of pneumonia the patient is suffering from. Serum treatment is most successful in treating pneumonia due to Type I pneumonia "germ," Dr. Cole said.

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Earthquakes waves have been known to travel twice round the earth.

PUBLIC HEALTH

Influenza and Scarlet Fever Are Still a Menace

INFLUENZA and scarlet fever are still on the rampage throughout the nation but meningitis has fallen off a bit, temporarily at least, reports from state health officers to the U. S. Public Health Service show.

This is the season for scarlet fever cases to reach the year's peak but the increase this year is higher than ever before, with 8,807 cases reported for the week of March 7.

The influenza picture is about what it has been for the past three weeks. For the week ending March 7 there were 11,240 cases reported. This is nearly double the number of cases for the corresponding week last year and nearly three times the average number of cases reported in the first week of March for the past 8 years.

Meningitis cases dropped from 307 cases the week of Feb. 29 to 256 cases the week of March 7. Health authorities are not sure whether the disease will continue its downward trend or rise again.

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PLANT PHYSIOLOGY

Green Light Poisonous to Primitive Green Plants

GREEN light is "bad medicine" for green plants of the primitive group known as the algae. They seem to find it definitely poisonous, faring worse in its presence than they do in absolute darkness.

This hitherto unknown fact about the relation of light and plant life was discovered by Dr. Florence E. Meier, in the laboratories of the Smithsonian Institution.

Dr. Meier has been working for several years, studying the various effects of radiation on plants. For simplicity's sake, she uses the lowly algae, most familiar in everyday life as the green scum that forms on stagnant water, and the green mats that spread over wet soil.

In her present experiments, she first kept a quantity of green algae in complete darkness, though supplied with mineral nutrients in solution. They of course failed to increase in number, and after a time degenerated and slowly died.

She exposed a similar quantity to full sunlight. As expected, they increased and multiplied—fourfold in two weeks. Then she tried the effects of various parts of white light. A narrow band of blue light was distinctly encouraging; the algae increased threefold in the same period. Red and yellow light gave results not quite so good—only twofold increase in two weeks.

But green light was worse than no light at all. The cells not only refused to increase in number, but actually decreased. There was no cell division, and many of the cells died. The green light apparently is actually poisonous to these organisms.

Infra-red light—the invisible rays at the lower end of the solar spectrum—seem to have no more significance for plants than they have for the human eye. Under it, the algae cells acted just as they had in complete darkness.

Science News Letter, March 21, 1936

MINERALOGY

Three New Rare Minerals Brought to Smithsonian

DISCOVERY of three new minerals —rare and hitherto unknown constituents of the earth's surface—has just been announced by the Smithsonian Institution.

The first, which was collected and studied by Edward P. Henderson, mineralogist of the U. S. National Museum staff, is a bright canary-yellow colored powdery mineral. It came from the uranium-vanadium bearing sandstone along the north wall of the Gypsum Valley in Colorado, and has been named steigerite, in honor of Dr. George Steiger, formerly chief chemist of the U. S. Geological Survey. Analysis shows it to be a combination of vandium, aluminum oxides, and water.

The two other new minerals were announced by William F. Foshag of the National Museum staff. Both were found near Franklin Furnace, N. J. One is a variety of the rare mineral known as ganophyllite, first described in Sweden more than 40 years ago and since found in minute amounts in New Jersey. Ganophyllite is chemically very complex, being a mixture of silicon, aluminum, iron, calcium, magnesium, and other oxides, with bound water.

The second new material is described by Dr. Foshag as a "zincian amphibole" —a form of the mineral known as amphibole but which contains an unusual amount of both zinc and manganese. It occurs in very close association with the ganophyllite and would be confused on superficial examination with the ordiary form of horn-blende.

Science News Letter, March 21, 1936

IN SCIEN

PHYSICS

Six Step Atom Smasher For Speedier Atomic Particles

EXPERIMENTS are under way at the University of Chicago to construct an improved atomic bombardment apparatus for use in creating artificial radioactivity and transmutation of the elements.

The equipment would be similar in principle, but with a slight variation, to the giant "cyclotron" magnetic accelerator apparatus of Prof. E. O. Lawrence at the University of California, state Dr. Robert J. Moon and Prof. William D. Harkins (*Science*, Mar. 6).

Dr. Lawrence's apparatus speeds up the desired atomic particles twice each trip around the apparatus and thus ultimately gives them energies comparable with 7,000,000 electron-volts of energy.

The new Chicago experiments have as their goal the hope that particles in the apparatus can be speeded up, not two but three or six times each revolution. "If successful," state Dr. Moon and Prof. Harkins, "this system should make it possible to attain much higher equivalent voltages."

Technical difficulty anticipated in the research is the attainment of some accurate method of using three-phase alternating current to provide the three or six "kicks" to the particles as they speed round and round in the apparatus.

Physicists want higher energies of the particles in their bombarding experiments because it will then be possible to pierce more easily the electrical repelling barriers which guard the nuclei, or cores, of atoms.

The whole of the new nuclear physics is intimately bound up with the successful breakdown of this nuclear barrier. The host of startling effects obtained in Dr. Lawrence's University of California laboratories has been due to the driving ability of his giant cyclotron apparatus. Any way to increase the effectiveness of the equipment, as proposed by the University of Chicago scientists, is an important step in unlocking the secrets bound up inside the atom.

Science News Letter, March 21, 1936

ENE FIELDS

MEDICINE

Half Million Workers Are Exposed to Silicosis Cause

THE CONTROL and prevention of silicosis, the disease that attacks workers in certain dusty trades and which is now a subject of Congressional investigation, is mainly a medical problem, Dr. A. J. Lanza of the Metropolitan Life Insurance Co., New York City, told the American College of Physicians. The severe type of the disease is gradually disappearing, but a milder type is very common throughout industry, Dr. Lanza finds.

The disease is chronic and progresses slowly, the rate at which it develops depending on the amount of dust in the air and the amount of silica in the dust.

Dr. Lanza estimates that at least half a million workers are exposed to conditions that cause silicosis. X-ray pictures of the lungs are essential in diagnosing silicosis but Dr. Lanza warned physicians not to depend on X-ray films alone in diagnosing this condition. Physicians who interpret X-ray films for diagnosis of this condition should be experts on the general appearance of the healthy chest as revealed by X-ray films.

Science News Letter, March 21, 1936

MEDICINE

Doctor's Hunch Helps "Bleeder's Disease"

HOW a doctor's hunch led to what appears to be an effective way of treating children suffering from hemophilia, the hereditary bleeder's disease which afflicts members of European royalty, was told by Dr. Roger I. Lee of Boston to the American College of Physicians.

The method consists in giving doses of placental extract by mouth. The man who had the hunch about it is Dr. R. B. Eley of Boston. This doctor had been giving another substance extracted from the placenta to prevent measles in children. Dr. Eley could give no reasons why he thought placental extract would help bleeders, Dr. Lee said. Nevertheless, it seems to work though only time will show its true value. It is not as successful with older children and not at all with adults, probably, Dr. Lee explained, because digestion in adults keeps the blood-clotting substance of the extract from being absorbed by the system.

The fact that the extract is remarkably effective in children, however, is encouraging, since Dr. Lee said that if the little boys who have inherited this condition can be gotten safely past their twenty-first birthdays, their chances of surviving are pretty good. If the swollen knees, due to hemorrhage around the knee joints, which are characteristic of the disease, appear early in childhood, the boy's chances of living till he is twenty-one are pretty slim, Dr. Lee said.

The big thing in treating this condition, Dr. Lee said, is to start the clotting process in the patient's blood. Once started at clotting, the blood of a bleeder will form a clot like blood from normal persons. Dr. Lee mentioned various substances that have been used in trying to start this clotting process, among them an extract from the spleen.

Science News Letter, March 21, 1936

ARCHAEOLOGY

Roman Quarry in Germany Bears Sun-Religion Signs

ROMAN soldiers stationed in southern Germany nearly 2000 years ago "went to temple" with the German "Mädels" on Sunday, just as American doughboys did a few years ago. And they absorbed some of the then prevailing German religious ideas, recording them in rough but spirited inscriptions on the walls of the quarry where they were detailed to work on week-days.

Basis for a romantic story of this kind has been patiently worked out from rock-carvings in an ancient quarry near Bad Dürckheim, which long puzzled archaeologists. Their significance, as finally read, is reported by Director Friederich Sprater of the Historical Museum of the Palatinate, in Speyer, Bavaria. (*Die Umschau*, Feb. 2).

Inscriptions found in several parts of the quarry identify the men who worked it long ago as a detail of soldiers of the Twenty-Second Legion, with headquarters at Mainz. But the religious carvings are all native German. They are symbols of a form of sun-worship, and include numerous figures of horses, a rooster, a man dancing with a spear, a bird fighting a snake, and several pictures of a wheel carried aloft on a pole. Only one carving of a swastika has been found on the rocks.

Science News Letter, March 21, 1936

PSYCHOLOGY

Now "Basal Age" Shows How Child Will Do in School

IT'S NOT the number of a child's birthdays, but his "basal age" that tells whether he is old enough to get along in his school grade, Dr. Ira S. Wile and Rose David told the meeting of the American Orthopsychiatric Association.

The traditional practice of placing a youngster in first grade when he has seen six summers, never earlier or later, is all wrong, they indicated. So is the more up-to-date practice of grading by "mental age."

Besides the age reckoned by birthdays (chronological age as it is known technically) children have as many other ages as Shakespeare described in the "Seven Ages of Man." They are: anatomical (growth), physiological (physical development), psychological (mental development), pedagogical (school achievement) emotional and social ages. All these ages should be considered in grading the child. But more important than any of these is the "basal age."

"Basal age," as described by Dr. Wile, is a more meaningful variation of mental age. When psychologists say that a child has a mental age of six years, they mean that he does as well on certain tests as the average 6-year-old. He may miss some questions entirely but do well on others.

If, however, the child has a basal age of six years, it means that he can pass every one of the tests on the list expected of the 6-year-old.

Present methods of plumbing intellectual function are something like plugging a watermelon to see what it is like before buying it, Dr. Wile pointed out. In either case a conclusion is drawn concerning the whole, either watermelon or intellectual function, from a small section of its content. Tests for intelligence quotient and mental age tell something about intellectual function but they do not tell everything.

"Throughout the country," Dr. Wile said, "there are too large percentages of children who are failures in reading, likewise disgraceful proportions of children who are victims of retardation and non-promotion because of maladjustments in the school system. The numerous victims of school failure in single subjects are penalized because educators lack an appreciation of their mental organization."

Science News Letter, March 21, 1936

PALEOBOTANY

Arctic Never Tropical

Months of Night Would Have Been Fatal to Plants; Fossils From High Latitudes Confirm Theory

By DR. FRANK THONE

See Front Cover

FORESTS that grew ages ago in the lands around the North Pole were never tropical, as old-time natural history books used to say. For theoretical reasons, they couldn't have been. And when the theory is checked up by examining fossils from the Far North the fossils give strong evidence that the theory is right. Thus another favorite notion of our younger days is outlawed to the limbo of facts that have been turned into fictions.

Not that there never were any forests around the North Pole. There were; great and luxuriant ones, if the wealth of fossil leaves and other plant parts is any indication. Where the tallest trees now are little willows six inches high, in such places as the islands north of Canada and Siberia, there were once woods as pleasant as any to be found in Ohio or Oregon. But the point is, they were such woods as can be found now in Ohio and Oregon, or perhaps Georgia and Arkansas, and not such jungles as those of Brazil or Burma, as was once imagined.

The destruction of the myth of the arctic tropics is the result of the rubbing together of two scientists' minds. Both of the men are Johns Hopkins professors, and both are interested in plants, though in widely different phases of plant affairs. One is the Dean of the University, Prof. Edward W. Berry, whose scientific specialty is the study of fossil plants of the long ago. The other is Prof. Burton E. Livingston, plant physiologist, who pries into the life processes of plants now in existence. It was Prof. Livingston who set off the theory, and Dean Berry who checked it up by looking over the fossil records, and found it was so.

Nights Too Long

The two men were discussing the problem of ancient climates in the Arctic one time, when Livingston said to his friend: "Look here; there simply couldn't have been Arctic forests of the kind we have in the tropics now, no matter how much milder the earth's climate may have been in past ages. Think of those months of night they have in the polar lands!"

Dean Berry thought, and saw the point. With the sun completely off the job a dozen weeks or more in the year, and low on the horizon a good deal of the time when it did come back, the dark period must have been a time of very considerable cooling off, no matter how much warmth might have been imported from southern latitudes by way of ocean currents. Even in its palmiest days, the far north must have had something very much like a real winter every year, simply because the principal source of heat was turned off.

But even supposing that somehow or other the northern air could have been kept tropically warm with the sun away for long periods, it would still have been impossible for a tropical forest to exist in the Arctic. For plants must have light as well as warmth. An evergreen, continuously growing tropical forest must have the strong sun pouring on its leaves every day, to supply energy for the formation of foodstuffs that build up the plant's body and are burned up in its life processes. Shut off the sun, and they're simply out of luck.

Try it Yourself

You can test this point on a small scale yourself. Just put one of your tropical houseplants—geranium or begonia or fuchsia—away in a closet that is warm enough but completely dark, and leave it there for a couple of months; keeping it watered, of course. Then, as you wend your way to your florist's to buy yourself a new plant, reflect what a whole Arctic-ful of tropical plants would have been up against the first time the sun dipped beneath the southern horizon and stayed gone for an equal period.

What a feast there would have been, in the damp, warm dark, for preying fungi and swarming blind insects, while the plants, their life-forming leaves paralyzed without light, could make no growth to replace their losses. The returning sun, months later, would have looked upon the fragments of a most macabre banquet! Only, with such odds against it, the ordinary type of tropical forest could of course never have come into existence at all.

One type of tropical forest, and one type only, could face such a season of dearth as a long-absent sun would force upon it. In lands such as India, where the monsoons blow — rain-bringing winds from one direction half the year and parched waterless winds from the opposite direction the other half—in such lands, there develop what are called "monsoon forests": woodlands that lose all their leaves at the beginning of the dry season as our own more familiar forests lose theirs at the beginning of the cold season, and then burgeon forth again with the returning rains. It is imaginable that tropical trees might have trained themselves to strip and stand bare against darkness as monsoon forest trees strip and stand bare against drought.

What Actually Grew

But before attempting to construct such an imaginary dark-adapted tropical forest, it might be worth while to take a look at the fairly abundant fossil plant remains from far northern lands, and see what kinds of trees actually did grow there.

That is what Dean Berry did. He looked over all the Arctic fossil leaves

FOSSIL LEAF

The sycamore, native now "On the Banks of the Wabash" and points south, was a characteristic tree of the ancient Arctic.

NEVER IN ARCTIC

Arctic fossil deposits have never yielded any dinosaur bones. These great reptiles, being cold-blooded, could never have lived through the months of chilly night, even when the regions were warmer than they are now; and they were too big to burrow into the mud and hibernate as smaller reptiles in temperate lands do today.

in collections he could get at, and examined lists compiled by other scientists. And he found plenty of evidence that the old Arctic forests had been like those of the modern temperate zones rather than like those of the tropics. In recent geologic times, when plants were naturally most like modern ones, there grew in the Arctic not such tropical trees as banana and rubber and breadfruit, but old familiar Yankee friends like maple and sycamore and hazel, together with sweetgum and magnolia and cypresses and other trees from down in Dixie. Quite distinctly the fossils told of a temperate climate, possibly even a warm-temperate climate, but certainly not a tropical one. There were also redwoods, which are now to be found only in California; but the modern California redwoods grow at high enough altitudes or far enough north in their state so that they get their regular doses of frost and even of snow. There were species of the curious maiden-hair tree or ginkgo, now known from China and Japan, and cultivated also in America and Europe; but this tree is also used to frost, and will survive even the stiff winters of central Iowa.

With the Saber-Tooth

Forests of this type grew in the lands about the Pole before the last Ice Age, when saber-tooth tigers and enormous elephants and other fierce killers and lumbering monsters prowled and crashed about where now our cities stand. Forests not unlike them grew in the same lands in even more remote times when dinosaurs wallowed in the swamps and waddled about on the dry land; for animals and plants have evolved at greatly different rates in recent times, and we still have many of the same genera in the garden that the dinosaurs ate, whereas not only the dinosaurs but even the early and "medieval" mammals have utterly disappeared.

Hardy Figs

It is not to be denied that there are some plants of even a little more marked warmth-loving nature. Figs, for instance. But Dean Berry calls attention to the hardiness of some fig species, citing trees that bear regular crops as far north as Baltimore. It is also not impossible that even hardier species may have existed in the past, and died out since.

Another possibly troublesome plant, of even more marked tropical affiliations, is a genus of palm, or what is supposed to be a palm, for the specimen is imperfect and the determination uncertain. But assuming it to be a genuine palm, there is no necessity for admitting it to be a tropical one. The palmetto of our own South grows quite freely as far north as the Cape Fear River in North Carolina, where frost is by no means unknown. Even in Florida, where the palmetto is at its best, not merely frosts but hard, ice-forming freezes, are occasional visitants. And it is stated that some hardy palm species can grow successfully out-of-doors the year round in southern England. So even a couple of palms do not necessarily spoil the temperate-zone climate of the ancient Arctic.

Searched the Past

Not content with establishing temperate-zone floras for several relatively recent geological periods in the Arctic, Dean Berry pushed his investigation back to the very earliest times for which plant fossils are known from the far north. The further back he got, of course, the less knowledge he could claim of the climatic preferences of the plants. For these earlier plants are now as dead as the dinosaurs, and most of them have left no direct descendants.

However, if we may hazard a guess that ancient ferns and horse-tail rushes were anything like modern members of the same families, that leaves the Arctic still cool, for these types belong to temperate regions quite as much as they do to the tropics. Even the great tree-fern forests of New Zealand get snowed upon quite frequently. Even cycads, which are plants that look like palms and are often sold as "palms" but are really more nearly related to the pines, do not necessarily indicate past tropical conditions in the north, though most cycads are hot-land plants now. There is one species of cycad that grows thickly in the pine woods of northern Florida, where it endures and survives the same occasional freezes that the palmetto has to stand.

Another point that was settled by Dean Berry's study was the old perennial question of a "wandering pole." Some scientific speculators supported the theory that the axis of the earth has not always been where it now is, but that the poles have shifted occasionally. The zonation of the fossil plants around the pole, Dean Berry finds, lends support to the idea of a permanently located axis rather than to this theory of a wandering one.

What Did Animals Do?

Although Dean Berry refrains from discussing animals except incidentally in reporting on his study, a few inferences may be allowable. For animals no less than plants must have felt the effects of the long dark and consequent chill, and the fall of leaves from the trees and the death of other vegetation. Winter in the ancient Arctic must have been something like winter in the United

States of today, with the added feature of permanent darkness the whole season through. Hence the animals of the ancient Arctic must have been able to find their food even in the dark, or by moon or aurora light, as the caribou and musk-ox and polar fox do now; or else they must have dodged the problem by going into hibernation and sleeping the winter out. There was, of course, more food, as the presence of such enormous gross feeders as woolly mammoth and hairy rhinoceros and giant bison have testified with their bones.

The discovery of a land-living dinosaur in the Arctic would be a somewhat embarrassing thing for Dean Berry's hypothesis. Fossils of sea dinosaurs, like Ichthyosaurus, have been found in the far north; but these need not count. They lived in the water, and probably moved about the world as freely as whales do now. But a terrestrial dinosaur—at least one of any size—would indicate either a fairly high year-round temperature or else some adaptation to cold weather not possessed by any existing reptile or other cold-blooded animal. While warm-blooded creatures can brave the winter, the cold-blooded beasts must get out of the way. Land-living reptiles, and many aquatic ones as well, burrow into the ground or mud when autumn chill warns them, and emerge when the sun warms the earth in spring.

But a Diplodocus was too big to be a successful burrower—to twist Falstaff a bit, he would have required a mountain for his mummy-case. It is just possible that he might have wallowed himself deep enough into a swamp or lake bottom, but really not very likely. However, although dinosaur bones have been found pretty well up in Canada, and abundantly in Mongolia, none are on record yet from the lands of the long dark, so Dean Berry's idea is still safe from being tramped on by their ponderous feet.

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Science News Letter, March 21, 1936

PSYCHIATRY

Discovery of Brain Defect Clears Patient of Charges

HOW a special kind of X-ray picture, which showed an absence of part of the brain tissue in a 19-year-old boy, cleared the young patient of criminal charges was told by Dr. Spafford Ackerly of the University of Louisville School of Medicine at the meeting of the American Orthopsychiatric Association.

The patient was facing a long term sentence because of persistent automobile stealing when he was brought by his family lawyer to the psychiatrist. The patient had a record of petty stealing and misbehavior at school. He was given to "impulsive wanderings," when he would suddenly drop what he was doing and depart for distant cities, hitch-hiking or, more often, going in a stolen automobile.

Physical and neurological examination and ordinary X-ray pictures of his head showed nothing wrong. He had a normal intelligence rating and had reached the second year of high school. The lad was a convincing talker, made a good impression and was so well-mannered that he was termed a "little Chesterfield." After one of his escapades he would be very contrite, but this feeling did not prevent another escapade.

Finally the psychiatrists decided to make an encephalogram. This is a special kind of X-ray picture. Some of the fluid within the brain and spinal cord is withdrawn and an equivalent amount of air is injected. X-ray pictures taken after this procedure show the various cavities or ventricles of the brain more clearly than plain X-rays do.

The encephalogram of this 19-year-old boy showed a defect in the front part of his brain. Operation was then performed and a "marked absence" of this part of the brain, called the prefrontal lobe tissue, was found on both left and right sides.

Scientists are not yet sure just what the function of this part of the brain is, although it is being extensively investigated at present.

In the case Dr. Ackerly reported, discovery of the absence of this brain tissue resulted in clearing of the criminal charges against the patient, who has since been put under proper supervision to protect himself as well as the community.

"Without the encephalogram procedure, injustice to both parents and patient would have continued," Dr. Ackerly reported.

Science News Letter, March 21, 1936

GENERAL SCIENCE

"Who Owns Our Science?" Writer Wants to Know

THE GREATEST and deadliest of plagues is poverty, the lack of wherewithal with which to buy what people are collectively willing and able to produce.

Dr. Paul de Kruif, he of "Microbe Hunters" and "Hunger Fighters," in his new book probes with literary lance this cancer of money lack, satirically titling it with a query about little, helpless children: "Why Keep Them Alive?" (Harcourt, Brace).

Dr. de Kruif tells tales of medical advances made ineffective by money lack. There was Joan, who died of rheumatic heart disease, an illness that passes by well-fed children. Little Joan whose father was on relief, little Joan whose heart might not have beat itself out if she had had an economic chance.

Joan's story stirred Dr. de Kruif to ask, how this infamy in a land of enormous wealth could continue? This suggestion lost him a friend, grown rich from applying science to human use.

So Dr. de Kruif formulates his new understanding in fighting, vibrant words: "I knew that the clever men who monopolized the common inheritance of science would never share it, fundamentally. I knew that their greed, based upon fear, made them indifferent to a heartbroken child.

"I understood that the question today, that will finally set friend against friend, brother against brother, is this one—who owns our science?

"I saw that once the plain people, the mass, understand the whole truth of the story of children like our Joan, once they get it clear in their heads what it is that limits the food, the clothes, the shelter, the science that

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could have made her strong and happy —they will unite at last, remembering the martyrdom of the millions of those like Joan.

"They will remember the wars between nations that have served so well to divert them from anger at their own starvation, at the murder of their own children by poverty.

"They will ask: If, in war, there is always limitless credit to kill people, so that no war ever stops for lack of dollars, francs, marks, or pounds, why then isn't there limitless wherewithal to arm our science so that it will give life to all future heartwrecked children like Joan?

"At last the fundamental issue will be clear and absolutely simple, as it must be to move the mass to anger, to action.

"At last there will be the tramp, tramp, tramp of humanity marching, in spite of the tear gas and vomit gas bombs, in spite of the machine guns, till finally the leaders of the mass will stand face to face with those who now monopolize our common heritage, then those leaders will ask—

"Who owns our science?

"And they will give their own answer."

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PHYSIOLOGY

Increasing Waistline Called Menace to Health

WARNING for the man of forty whose waistline is so rapidly increasing that he must bend over to see his feet is to be found in a clinic held at the meeting of the American College of Physicians by Dr. William J. Kerr of San Francisco.

The pot belly is a menace to health as well as to manly appearance. Dr. Kerr, with the aid of two patients and numerous charts, showed how the sheer weight of the "bay window" throws the body out of line, interferes with breathing and eventually leads to failure of heart and lungs.

To relieve this condition, Dr. Kerr and his associate, Dr. John B. Lagen, first give the patient a heavy two-way-stretch elastic support to hold the heavy abdomen in place. When this is put on the patient, he immediately stands better, holds his head a little higher and straightens the sway-back. Next step in the treatment is diet to gradually reduce the big abdomen to normal. With this are prescribed strengthening exercises.

Science News Letter, March 21, 1936

BOTANY

NATURE RAMBLINGS *by Frank Thone*

The Importance of Lichens

LICHENS are those peculiar spreading patches of green and yellow and gray that look like spots of paint on the surface of rocks. They are sometimes loose and crumbly, like paint films that have peeled and cracked and curled up. Other kinds of lichens are loosely misnamed "moss," like reindeer moss, and the beard-lichen which Longfellow immortalized:

"The murmuring pines and the hemlocks,
"Bearded with moss . . ."

Lichens are strange among plants in that they literally lead double lives. Each patch of lichen is composed of masses of two entirely distinct kinds of plants: long fibers or filaments and fruiting bodies of a fungus, related to the molds and the mushrooms, and innumerable little one-celled green plants of the low order called algae. It has long been standard botanical doctrine that this is a mutual benefit society, but of recent years opinion has been swinging round to the idea that the fungus takes advantage of the alga, as a parasite. If the lichen is a plant society, it is a master-and-slave society.

Lichens are important to man in many and curiously diverse ways. Outstanding, however, is the lichens' function in turning stones into bread. Not that lichens are themselves much eaten by human beings. They are used as food only by peoples most hard-pressed for food, like the Japanese.

But lichens almost invariably the first attackers on the face of rock that is eventually to become soil. Their slow-creeping filaments, which take no account of years, can live through heat and cold, drought and wet, on the naked surface of the rock. Whenever conditions are right for them to grow a little more, they secrete a little acid, that slowly etches and roughens the rock surface, and thus begins the long cycle of its breakdown into soil that other plants can live in. It is an immensely slow process, but in the long aggregate an immensely effective one.

Lichens not only help to give man bread; they give at least some of us meat. The lichen known as reindeer moss is the mainstay of reindeer in northern Eurasia and of caribou on the Arctic slopes of North America. Hence it means meat in the pot, and skin clothes on the back, for Lapps and Tunguses and Eskimos and the Athapascan Indians. Nor must it be forgotten that once upon a time our own forebears, in Ice Age Europe, were hunters and eaters of reindeer.

Lichens finally are friends of the chemist. Litmus, without which a chemical laboratory can hardly be imagined, is the product of a lichen.

Science News Letter, March 21, 1936

ASTRONOMY

Plan Joint Expeditions To Study Solar Eclipse

AN expedition to Soviet Russia to observe the total eclipse of the sun June 19, 1936, will be sponsored by the Harvard College Observatory in collaboration with the Massachusetts Institute of Technology.

The totality belt, about 75 miles wide, starts in the Mediterranean and then swings northeastward across Greece, the Black Sea, Manchuria and northern Japan, ending at some point well out in the Pacific Ocean. The eclipse will not be visible in the western hemisphere.

By ***Max Born***

The Restless Universe

The mystery of perpetual change and the puzzles which relativity, electricity and the newer mathematics have presented are explained with authority and clarity in almost ABC language by an eminent physicist, who at present is Stokes Lecturer in Mathematics at the University of Cambridge. "The tremendous task of making the marvelous achievements of modern inquiry in physics, chemistry and astronomy intelligible to the lay reader . . . is performed in masterly fashion." — *Book-of-the-Month Club News.* Uniquely illustrated: by flipping the pages you can actually see atoms in action. $2.50

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In charge of the expedition will be Dr. Donald H. Menzel of Harvard, assisted by Dr. Joseph C. Boyce of Technology. Other members of the party have not yet been announced.

Emphasis on Spectrograms

According to Dr. Menzel, the party's program will be chiefly spectrographic, with particular effort to be directed to obtaining spectrograms of the chromosphere and the corona over a wide range of wavelengths. Special emphasis will be placed on the infra-red region of the spectrum, where present knowledge is only fragmentary.

The chromosphere, technically the outer layers of the sun, is a rarefied atmosphere enveloping the shining surface. Due to the brilliance of the sun, observations of the chromosphere are best obtained during an eclipse when the sun is hidden and only the rarefied atmosphere protrudes from behind the moon. From the observations to be taken, scientists hope that its chemical composition, the source of its excitation, the nature of its structure and many other problems in connection with the chromosphere may be cleared up.

The solar corona which lies above the chromosphere presents additional mysteries. Although the chromosphere has been spectrographically found to consist of helium, hydrogen, calcium, iron and other elements in their gaseous form, not a single one of the many known coronal lines has been positively identified.

Need More Data

Some scientists believe that the predominant element is a well-known substance, hidden by peculiar conditions existing in the corona. Dr. Menzel and Dr. Boyce have provisionally suggested that oxygen might be responsible, but additional data which may be obtained from the contemplated study of the infra-red coronal spectra are required to settle the question.

The Harvard-Technology expedition will be the guests of Dr. Boris P. Gerasimovic, formerly associated with the Harvard Observatory and now director of Poulkova Observatory at Leningrad.

Observations will be made from a point near the town of Ak-Bulak in the southern Ural mountains. Although Tomsk is a more favorable location, since it lies close to the central totality line and since the sun will be higher in the sky there, collected weather reports indicate that the chances for clear weather are appreciably greater at Ak-Bulak. Totality here will occur at 8 a. m., local time, when the sun is 36 degrees above the horizon.

Dr. Boyce sailed early in February and will spend two months at the Solar Physics Observatory at Cambridge, England, before proceeding to Russia. The rest of the party will sail sometime in April.

Another joint expedition to observe the total eclipse will be sent to Soviet Russia by Georgetown University and the National Geographic Society, it is announced by the two sponsoring organizations.

Dr. Paul A. McNally, S. J., director of the Georgetown College Observatory, will be leader of the expedition, accompanied by five others to be chosen from the staffs of the University and the Society. They will leave sometime in April and return in July.

Observations will be made from a point near Orenburg, Soviet Russia, because past weather records show that this region offers one of the best promises of clear weather along the whole path of the eclipse.

Science News Letter, March 21, 1936

PHYSICS

Studies May Yield Knowledge Of Heavy Water's Effects

A NEW and more precise value than has ever been obtained for the viscosity, or flowing qualities, of "heavy" water has been calculated in research conducted at Harvard University by Prof. Grinnell Jones and Dr. H. J. Fornwalt. Better knowledge of what effect heavy water may have on the body is only one possibility of the research.

Using an automatic timing device instead of the hand-operated stop watch employed for timing in previous viscosity tests, the two scientists have found that deuterium oxide, as heavy water is technically known, has a viscosity 23 per cent. greater than that of ordinary distilled water.

Although this figure differs only slightly from the results of other experimenters, who found a value of 23.2 per cent., the new figure is considered of prime importance in view of the extreme precision necessary in the calculations of modern science.

This precise viscosity measurement, for example, may prove to be of considerable importance to physiologists studying the effect of heavy water, which constitutes two hundredths of one per cent. of ordinary water, as found in the human body.

Many of the other investigations which have been in progress since the discovery of heavy water in 1934, may also benefit from the more accurate measurements. Outstanding among these are investigations to determine how the fluid affects animals and plants and research seeking to determine the electrical conductivity of the new liquid.

The Harvard measurement is also expected to aid scientists checking the possibility that the double-weight hydrogen atom alters important calculations and assumptions made by scientists before heavy water's discovery.

Prof. Jones' viscosity tests are similar to others in that the speed of fall of the liquid in a glass capillary tube forms the basis of measurement. In early experiments on heavy water, however, observation of the speed of fall was made by the human eye, and the time recorded with a hand-operated stop watch. This method, of course, involves the possibility of inaccuracy on the part of the observer and does not give a satisfactory timing record, since even the best stop watches are accurate to only a tenth of a second.

The Harvard scientists in their experiments used an automatic timing device which replaces the human eye with the infallible photo-electric cell. Time records were made on a fast-moving chronograph tape which enabled measurements accurate to one hundredth of a second. Possible error, they estimate, cannot exceed three or four thousandths of one per cent.

The research was undertaken at the suggestion of Dr. Harold C. Urey, discoverer of the liquid, after he had seen Prof. Jones' equipment for precise viscosity measurement. Prof. Jones is now conducting experiments to determine the surface tension of heavy water, also at Dr. Urey's suggestion. The fluid for both experiments was supplied by Dr. Urey.

Science News Letter, March 21, 1936

•First Glances at New Books

History of Science—Biography

MEN OF SCIENCE—J. G. Crowther—*Norton*, 332 p., $3.50. Biographies of the great group of near-contemporary British physicists, Davy, Faraday, Joule, Thomson and Maxwell, which revaluate these men in relation to abstract science, to their fellow men, and to the industrial age in which they lived. Reading these five biographies will give an insight and taste of the method and spirit of nineteenth century British science.

Science News Letter, March 21, 1936

History—Geography

WHY ON EARTH DID IT HAPPEN—John Robert Swenson—*Tardy Publ. Co.*, 256 p., $2. The geographic factor, that explains so much of history, is the thread on which chapters of this book are strung. The author shows how geography figured in the exploration of America, how it affected settlement of the country, and how it has played a role in the nation's wars, industries, and world relations. The book is intended for high school or college study, and is, in fact, very readable.

Science News Letter, March 21, 1936

Plant Physiology

GROWTH OF A GREEN ALGA IN ISOLATED WAVE-LENGTH REGIONS—Florence E. Meier—*Smithsonian Institution*, 12 p., 1 pl., 10c. (See p. 184.)

Science News Letter, March 21, 1936

Mineralogy

THE BOOK OF MINERALS—Alfred C. Hawkins—*Wiley*, 161 p., $1.50. A "must" book for anyone starting to collect minerals. It gives physical descriptions of important minerals and how to find them. Pictures of various types are included which lack only color. It does for mineralogy what a wildflower book does for the amateur botanist.

Science News Letter, March 21, 1936

Public Health

WHY KEEP THEM ALIVE?—Paul De Kruif—*Harcourt Brace*, 293 p., $3. See p. 188.

Science News Letter, March 21, 1936

Archaeology

MANUAL OF CHRISTIAN ARCHAEOLOGY—Orazio Marucchi, tr. by Hubert Vecchierello—*St. Anthony Guild Press*, 448 p., $3.50. This fourth edition of the late Prof. Marucchi's work was brought up to date archaeologically at the Pontifical Institute in Rome, and has now been translated for an American printing. The book deals mainly with early Christian Rome, and describes cemeteries, inscriptions, basilicas, and art relics. A very helpful feature is the reproduction throughout the text of a great many of the inscriptions and pictures cited.

Science News Letter, March 21, 1936

Ichthyology

TROPICAL FISH, THEIR BREEDING AND CARE—Edwin H. Perkins—*De La Mare*, 151 p., $1.50. A great deal of very practical information and advice compacted into one small book. The author logically starts by telling what provisions you need to make if you are "going in" for tropicals, and what troubles to expect, and then gives a brief account of a number of the best known and most satisfactory species.

Science News Letter, March 21, 1936

Archaeology

NEO-BABYLONIAN BUSINESS AND ADMINISTRATIVE DOCUMENTS — Ellen Whitley Moore — *Univ. of Michigan Press*, 396 p., $4. Students of ancient civilization and language will find many details of interest in the large number of tablets—249 in all—presented in this volume. The tablets, which are from the Louvre collection, have heretofore been published in their original form. They are now presented, each expressed in modern alphabetic equivalents, and also translated into English with notes.

Science News Letter, March 21, 1936

Paleontology

A PARADE OF ANCIENT ANIMALS—Harold O. Whitnall; Illus. by H. C. Millard—*Crowell*, 135 p. $2. Written so that quite-young readers can understand every word of it, illustrated with beautifully drawn, spirited sketches that would grace even a formal monograph, this is a really outstanding popularization of paleontology for children. It takes in the whole long parade of the past, from Eryops to Early Man, giving due consideration to the highlights of each chapter in historic geology.

Science News Letter, March 21, 1936

Archaeology

BIBLE AND SPADE—Stephen L. Caiger—*Oxford*, 218 p., $2. Students of Bible material will find this very helpful, for it is full of very definite information on archaeological points relating to the Old Testament. The author follows the historical narrative, pausing to show where inscriptions, ruins, and other archaeological evidence shed light. To bring his work neatly up to the minute, he gives an appendix account of the important discoveries at Lachish—writings on potsherds that offer a contemporary record of events in sixth century B.C. Bible history.

Science News Letter, March 21, 1936

Science—History

THE ROAD TO MODERN SCIENCE—H. A. Reason—*Bell., London*, 306 p., xxiv pl., 6s. A short history of science written, a little didactically, for the British young. In spite of local emphasis and the omission of a number of the names one would expect, the book is good, as a quick survey of the work which has made the background of science today.

Science News Letter, March 21, 1936

Biology—Philosophy

ORDER AND LIFE—Joseph Needham—*Yale Univ. Press*, 175 p., $2.50. A biochemist — therefore one who might be expected to be a mechanist—examines the vexed problem of the unity of the organism, with results very interesting to those who are concerned with the philosophical implications of the phenomena of life.

Science News Letter, March 21, 1936

•RADIO

March 24, 3:15 p. m., E.S.T.

ARMING AGAINST DISEASE—Dr. J. P. Leake, Medical Director of the United States Public Health Service.

March 31, 3:15 p.m., E.S.T.

THE EARTHQUAKE—MENACE AND TOOL—Commander N. H. Heck of the U. S. Coast and Geodetic Survey.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

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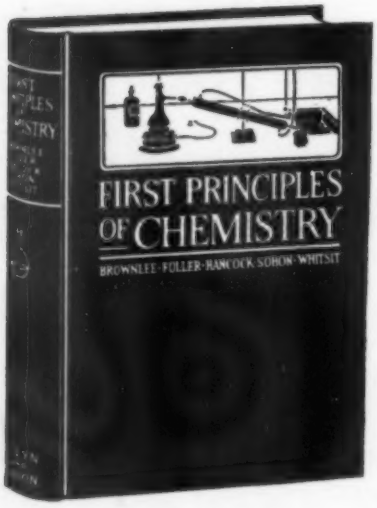
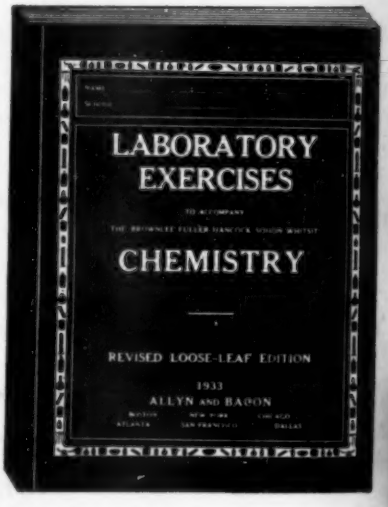
THE WORLD OF CHEMISTRY

WE LIVE our lives amid material things. To the understanding of this environment man has given centuries of toil and thought. Slowly superstitions have given way to scientific facts. Great minds have delved in obscurity to bring forth scientific principles. When these were numerous enough and became properly classified, the sciences of today came into being.



The pathways to the sciences were not dull and humdrum, for along the road lay adventure, romance, and even tragedy. Ever the scientist sought the truth. Always he regarded his labors as vain unless he gave a better understanding of the world about him and turned his discoveries to the service of mankind.

Chemistry offers a rich field to the inquiring mind and brings great reward to those who understand its teachings. It is of constant practical value. It tells how to select proper materials for every kind of construction. It has rendered available many metals and special alloys that make our trains, automobiles, and airplanes more serviceable. It has made the soil more fertile and has revealed the nature of our food. It shows us that the human body is a living chemical laboratory, and that even thought has a chemical basis.



The modern textbook in chemistry reflects its history, spirit and service to mankind. It is not a mere epitome of facts—scientific principles serve as luminous guides along the course the learner must take. Vivid illustrations and simple language make clear the practical applications of science. There is careful selection of valuable topics properly grouped. There are devices for testing the learning of the student in accord with modern educational practice.

Tested laboratory exercises supplement the ideal textbook and guide the student in his first-hand study of chemical phenomena. They make him appreciate the vividness of chemical reactions and train him to draw only those conclusions justified by the observed facts.

Best of all, the study of chemistry in this modern manner trains the mind in straight, honest thinking—the true preparation for facing the realities of the present day.

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